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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/820,149 | 03/28/2001 | Katsuhisa Yuda | NEC WNZ-2310 | 3988 |

7590 02/06/2003
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EXAMINER

CROWELL, ANNA M

ART UNIT PAPER NUMBER

1763

DATE MAILED: 02/06/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/820,149

Applicant(s)

YUDA ET AL.

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) See Continuation Sheet is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

Continuation of Disposition of Claims: Claims withdrawn from consideration are 3,6,9,12,15,18,21,24,27,30,33,36,39,42,45 and 47-51.

Continuation of Disposition of Claims: Claims rejected are
1,2,4,5,7,8,10,11,13,14,16,19,20,22,23,25,26,28,29,31,32,34,35,37,38,40,41,43,44 and 46.

DETAILED ACTION

Election/Restrictions

Applicant's election of Invention I and Species IV, Figure 6, claims 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 22, 23, 25, 26, 28, 29, 31, 32, 34, 35, 37, 38, 40, 41, 43, 44, and 46 in Paper No. 6 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 22, 23, 25, 26, 28, 29, 31, 32, 34, 35, 37, 38, 40, 41, 43, 44, and 46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The applicant recites the limitation, "wherein aperture ratio of the perforated holes to the plate is not greater than five percent". This limitation is indefinite since several aperture ratios can be established. For example, aperture ratio could be the number of holes to number of plates, or the diameter of the holes to the diameter of the plate. Furthermore, the term "holes" includes two or more holes and therefore to yield an aperture ratio of

less than five percent, the diameter of two holes would be larger than 100 holes. Thus, the flow back phenomenon would not be achieved. Examiner suggests defining the hole size in terms of diameter.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 4, 11, 13, 14, 16, 23, 25, 26, 28, 35, 37, 38, and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Yuda (Japanese Patent Publication 11-168094).

Referring to Drawings 8-10 and paragraphs [0040]-[0043], Yuda discloses a remote plasma chemical vapor deposition apparatus comprising a chamber wall 16 (body), oxygen gas inlet 5 (first inlet), monosilane and inert gas inlets 9, 24 (second inlet), oxygen plasma region 6 (plasma generation region), silicon oxide precursor region 10 (processing region), RF impression electrode 1 (energy source), middle mesh plate electrode 26 (plate, closure electrode, gas supplier plenum), and a counter electrode 2 (substrate supporter). Oxygen gas is supplied to the RF impression electrode and is excited to create oxygen plasma between the RF impression electrode and the middle mesh plate electrode. Monosilane gas and inert gas are supplied to the processing chamber via the middle mesh plate electrode.

The middle mesh plate electrode 26 divides the chamber 16 into a plasma generation region and processing region. The middle mesh plate electrode further includes several holes 27,

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28, 30 (plurality of perforated holes). The oxygen radical holes 27 have a plurality of upper and lower holes which are connected by tube walls. The oxygen radical holes 27 allow oxygen radicals to pass through the middle mesh plate electrode. Monosilane gas and inert gas flow through the monosilane gas nozzle 27 and inert gas nozzle 28 (gas injection holes) located in the bottom of the middle mesh plate electrode. A silicon precursor gas 10 is formed when the oxygen radical gas 7 mixes with the monosilane gas 27.

Regarding Claims 11, 14, 23, and 26

The middle mesh plate electrode 26 acts as both a plate and a closure electrode. The middle mesh plate electrode 26 is electrically grounded so that oxygen radicals may flow through the openings.

Regarding Claims 35 and 38

As seen in Figure 8, the distance between the holes is smaller than the distance between the middle mesh plate electrode 26 and the counter electrode 2.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 5, 7, 8, 10, 17, 19, 20, 22, 29, 31, 32, 34, 41, 43, 44, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuda (Japanese Patent Publication 11-168094) in view of Sameshima et al. (U.S. 5,304,250).

Yuda fails to teach the diameter of each hole inside the plate.

Referring to Figure 2 and column 4, lines 15-21, Sameshima teaches a remote plasma chemical vapor deposition apparatus which uses a disk shaped mesh plate 1 (plate, closure electrode) to divide the chamber into a plasma generation chamber 22 and a substrate treatment chamber 21. The disk shaped mesh plate 1 has a plurality of holes 4 and each hole has a diameter of approximately 3 mm. The hole size and number of holes allows plasma to form either a uniform film or etch a large substrate area. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the plate of Yuda with a hole diameter of approximately 3 mm as taught by Sameshima. This would allow plasma to form either a uniform film or etch a large substrate area.

Response to Arguments

7. Applicant's arguments filed November 19, 2002 have been fully considered but they are not persuasive.

1. Applicant has argued that the specification provides specific working examples of what is meant by "aperture ratio".

On pages 7, 8, and 12, the specification merely discloses the dimensions of the plate, the diameter of the perforated hole, the number of holes in the plate, and the aperture ratio. There is no specific working example in the specification of how the aperture ratio of 5% was determined.

2. Applicant has argued that the plain meaning of “aperture ratio of the perforated holes to the plate” is the relationship in cross-sectional area between the perforated holes and the plate.

As applicant has admitted the plain meaning of ratio is “the relationship in quantity, amount, or size between two or more things or a proportion.” For example, the “aperture ratio of the perforated holes to the plate” could be the number of holes to number of plates, or the diameter of the holes to the diameter of the plate. Therefore, one cannot assume the “aperture ratio of the perforated holes to the plate” is the relationship in cross-sectional area between the perforated holes and the plate since several aperture ratio relationships can be defined.

3. Applicant has argued that Yuda fails to disclose a flow back phenomenon of silane gas into a plasma generation region nor prevention of such a flow back phenomenon.

First of all, this flow back phenomenon is not commensurate with the scope of the claims. However as described in paragraph [0041], Yuda satisfies this requirement by providing a middle mesh plate electrode 26 with a hole 30 diameter the same length as the Debye length. When this occurs, plasma is prevented from passing through the holes and the back flow of monosilane gas is prevented.

4. Applicant has argued that Yuda has failed to consider an aperture ratio.

Once again, Yuda satisfies this requirement by designing the size of the holes the same length as the Debye length. Since the same problem (preventing flow back phenomenon) area is solved, the aperture ratio must be less than five percent.

5. Applicant has argued that Yuda fails to disclose a first inlet communicating with the plasma generation region to introduce a first gas into the plasma generation region, and a second inlet communicating with the processing region to supply a second gas into the processing region.

As seen in Drawings 1, 5 and 8, Yuda satisfies this requirement by providing an oxygen gas inlet 5 into the plasma generation region and a monosilane gas inlet 9 and an inert gas inlet 24 into the processing region. The claims do not preclude introducing two gases into a processing region, and furthermore inert gases are non-reactive.

6. Applicant has argued that Sameshima fails to teach an aperture ratio and separate gas inlets.

The Sameshima reference was only used to teach the diameter size of the aperture hole. Both Yuda and Sameshima teach having separate gas inlets.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956.

The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

AMC *ame*
February 3, 2003


SHRIVE P. BECK
SUPERVISORY PATENT EXAMINER
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